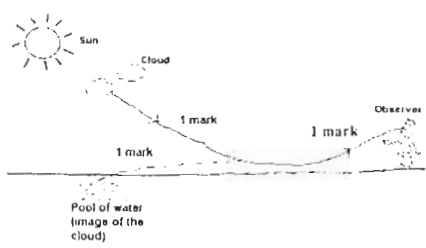


PHYSICS PAPER 1 (4531/1)

1	D	26	D
2	A	27	C
3	C	28	C
4	C	29	A
5	C	30	B
6	D	31	B
7	B	32	B
8	B	33	C
9	C	34	A
10	C	35	C
11	D	36	A
12	C	37	D
13	C	38	B
14	C	39	B
15	B	40	A
16	A	41	C
17	B	42	D
18	A	43	A
19	A	44	C
20	C	45	A
21	D	46	C
22	D	47	D
23	C	48	B
24	A	49	B
25	C	50	A

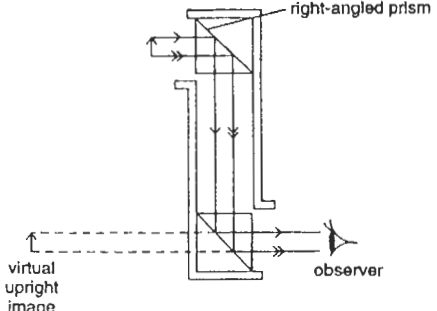
PHYSICS PAPER 2 (4531/2)

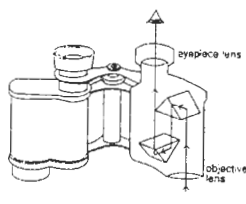
SECTION A				
1.	(a)	(i)	Ammeter	1 mark
		(ii)	To measure the the potential difference across the wire/conductor	1 mark
	(b)	(i)	Error due to the instrument which has a reading when it is not in used	1 mark
		(ii)	1 μ A	1 mark
				(4 marks)
2.	(a)	(i)	More responsive to heat	1 mark
		(ii)	The fine and uniform tube allows a movement of the liquid to be observed Easily / higher sensitivity	1 mark
	(b)	(i)	15 mm/1.5 cm	1 mark
		(ii)	$\theta^\circ = \frac{150 - 15}{190 - 15} \times 100$	1 mark
			$= 77.2^\circ\text{C}$	1 mark
				(5 marks)
3.	(a)		electromagnetic waves / transverse waves	1 mark
	(b)		Constructive interference takes place and bright fringes are observed. Destructive interference takes place and dark fringes are observed.	2 marks
	(c)		Lights with one colour or one wavelength	1 mark
	(d)		$\lambda = \frac{a \times D}{D}$ $= \frac{0.5 \times 10^{-3} \times 6 \times 10^{-3}}{5}$ $= 6 \times 10^{-7} \text{ meter}$	2 marks
				(6 marks)
4.	(a)		Total internal reflection	1 mark
	(b)	(i)	Light ray as follow	
				3 marks
	(c)		Inverted / virtual	1 mark

	(d)	$n = \frac{1}{\sin C}$ $1.76 = \frac{1}{\sin C}$ $C = 34.6^\circ$			2 marks		
					(7 marks)		
5.	(a)		Distance/time		1 mark		
	(b)	1	Before: water levels are the same and the roof stay intact		1 mark		
		2	After : water levels are not the same and the roof rise up		1 mark		
	(ii)		Pressure above the roof is higher compare to pressure below		1 mark		
	(iii)		Speed increases pressure decreases or vice versa		1 mark		
	(c)		Bernoulli		1 mark		
	(d)		Q is slower and R is faster		1 mark		
			Q is higher and R is lower		1 mark		
					(8 marks)		
6.	(a)	(i)	Farthest in Diagram 6.2 compare to Diagram 6.1		1 mark		
		(ii)	Decreases		1 mark		
	(b)		streamline		1 mark		
	(c)	(i)	$W = 10 \times 70$ $= 700 \text{ J}$		1 mark		
					1 mark		
	(c)	(i)	Kinetic energy to potential energy to kinetic energy		2 marks		
	(d)	(ii)	Sound/ heat		1 mark		
					(8 marks)		
7.	(a)	(i)	It has a high resistance and so little or no current flows through R_2 . Hence the potential at B is close to 0V		1 mark		
		(ii)	When it is dark, very little light falls on the LDR and so its resistance is high. The potential at A is close to 0V.		1 mark		
			When it is bright, a lot of light falls on the LDR. The potential difference across the LDR drops to 0V and so the potential at A is close to +6V.		1 mark		
	(b)		Input A	Input B	Output Q	All correct- 2m At least 1 wrong – 1m All wrong- 0m	2 marks
			0	0	1		
			0	1	0		
			1	0	0		
			1	1	0		
	(c)	(i)	Input A: 0 Input B: 0 Output Q: 1				3 marks
		(ii)	Light level : dark Soil condition: dry				2 marks
							(10 marks)

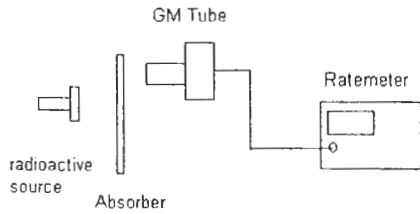
8.	(a)	(i)	A resultant force is a single force which is a vector sum of all the forces that act on the object.	1 mark
		(ii)	The resultant force is equal to zero	1 mark
	(b)	(i)	$\cos \theta = \frac{20}{25}$ $\theta = 36^\circ 52'$	2 marks
		(ii)	$T \sin \theta + T \sin \theta = 20$ $2 T \sin \theta = 20$ $T = 16.67 \text{ N}$	3 marks
	(c)	(i)	Tension of the string in diagram 8.3 is the maximum because the angle θ is the smallest	2 marks
		(ii)	Tension of the string in diagram 8.2 is the minimum because the angle θ is the largest	2 marks
		(iii)	Diagram 8.2	1 mark
				(12 marks)

SECTION B

9.	(a)	(i)	Speed of light in vacuum or air Speed of light in the medium	1 mark
		(ii)	<ul style="list-style-type: none"> - the rays are parallel before passing both lenses. - In diagram 9.1 the ray are focused - At F - In diagram 9.2 the ray are diverted - From F - Refraction 	1 mark 1 mark 1 mark 1 mark 1 mark 1 mark (max 5 marks)
	(b)	(i)	Draw a diagram to show the rays of light Total internal reflection. 180° fish eye view Obstacle	
	(c)	(i)	Draw a correct ray diagram with at least 2 rays Box Using two right-angled prisms Arrangement of prism Total internal reflection	1 mark 1 mark 2 mark 1 mark 1 mark
				

	(ii)	Draw a diagram to show arrangement	
		Right angle prism which cause the rays to bent through 180°	1 mark
		4 prism	1 mark
		2 eye piece	1 mark
		2 objective lens	1 mark
			
		(20 marks)	
10	(a)	It is a coil carrying a current field	1
	(b)	<ul style="list-style-type: none"> number of turns in solenoid in Diagram 10.1 is more the magnitude of current flowing in Diagram 10.1 is bigger the number of paper clips attracted to solenoid in Diagram 10.1 is more 	3
	(c)	(i) the strength of the magnetic field increases when the magnitude of current increases	1
		(ii) the strength of the magnetic field increases when the number of turns in solenoid increases	1
	(d)	<ul style="list-style-type: none"> When the switch is on, the soft iron core becomes electromagnet. End A becomes north pole. End B becomes south pole. Magnet P repels from end A. Magnet Q attracts to end B. 	4
	(e)	(i) <ul style="list-style-type: none"> when the switch is on, current flows in the solenoid, soft iron core becomes electromagnet electromagnet attracts the iron armature, the hammer hits the gong and bell rings when the hammer moves towards the gong, the contacts open, current stops flowing The iron core loses its magnetic 	4
		(ii) <ul style="list-style-type: none"> increase the number of turns of wire the magnetic field produced by each turn overlap to produce a resultant field which is much stronger. Increase the magnitude of the current / dry cells To increase the strength of the resultant magnetic field Replace the straight iron core with a U-shaped iron core Produce stronger magnetic field strength 	6
		(20 marks)	

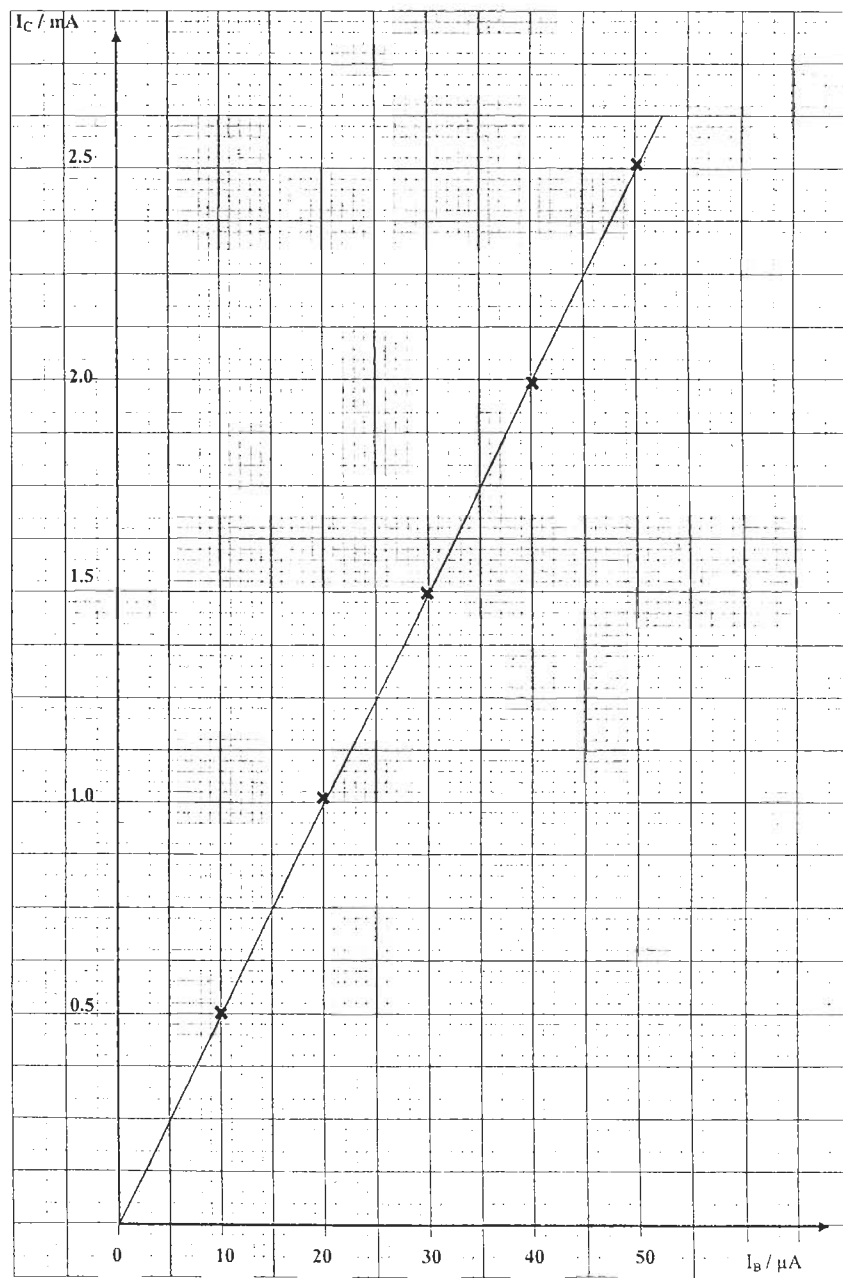
SECTION C				
11.	(a)	(i)	Force per unit area	1 mark
		(ii)	High altitude low density of air	1 mark
			Less collision of molecules with surface	1 mark
			Low altitude high density of air	1 mark
			More collision of molecules with surface	1 mark
	(b)	(i)	$hpg = 0.76 \times 13\,600 \times 10$ $= 103360 \text{ Pa}$	1 mark
		(ii)	$hpg = 0.1 \times 13\,600 \times 10$ $= 13600 \text{ Pa}$	1 mark
		(iii)	0 Pa	1 mark
	(c)		Large tyre – better stability Liquid in hydraulic system – liquid cannot be compressed Large mass – big inertia Large base area – better stability Low centre of gravity – better stability	2 marks 2 marks 2 marks 2 marks 2 marks (maximum 8 marks)
			Choose – M	1 mark
			Large tyre, liquid in hydraulic system, large mass, large base area or low centre of gravity/better stability, liquid cannot be compressed and big inertia	1 mark
			(20 marks)	
12	(a)	(i)	Half-life is the time required for the activity of a sample of the radioisotope to become halved.	1 mark
		(ii)	<ul style="list-style-type: none"> emits β – particles, can penetrate the soil and emerge from the ground 	2 marks
			<ul style="list-style-type: none"> sufficiently long half-life after a period of 2 days the activity of the source will be weak enough to not pose any danger 	2 marks
			<ul style="list-style-type: none"> A Geiger- muller Very sensitive detector/ it can be carried about from place to place 	2 marks
			<ul style="list-style-type: none"> A ratemeter It gives the count rate directly 	2 marks
			<ul style="list-style-type: none"> R is suitable Emits β – particles, have sufficiently long half-life 	2 marks
	(b)	(i)	Arrangement of apparatus:	1 mark

		 <p>radioactive source Absorber GM Tube Ratemeter</p>	
		<ul style="list-style-type: none"> Observed the reading on the scaler without an absorber Put a piece of paper, aluminium and lead between the source and the detector in turns. For each kind of absorber, record the reading on the ratemeter. Carry out the same procedure for the three substances. α radiation will be stopped by all three kinds of absorber β radiation will be stopped by aluminium and lead γ will be stopped by lead only 	<p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p>1 mark</p>
	(c)	<ul style="list-style-type: none"> wear a photographic badge to measure the intensity of radiation in the surroundings store radioactive substances in a lead container use a pair of forceps or tweezers to hold a radioactive substance. 	<p>2 marks (any two)</p>
			(20 marks)

PHYSICS PAPER 3 (4531/3)

SECTION A

NO	MARKING SCHEME	MARK													
		SUB	TOTAL												
1 (a)(i)	- Base current / I_B	1	1												
(ii)	- Collector current / I_C	1	1												
(iii)	-Length of the connection wire	1	1												
(b)(i)	-C	1	1												
(ii)	- I_B and I_C	1													
	- Correct column of manipulated variable and responding variable	1													
	- State the units of I_B and I_C correctly	1													
	- All the values of I_C are correct	2													
	- [4 or 3 values of I_C are correct.....1 mark]														
	- The values of I_C are consistently to one decimal point	1	6												
(c)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>$I_B / \mu A$</th> <th>I_C / mA</th> </tr> </thead> <tbody> <tr><td>10.0</td><td>0.5</td></tr> <tr><td>20.0</td><td>1.0</td></tr> <tr><td>30.0</td><td>1.5</td></tr> <tr><td>40.0</td><td>2.0</td></tr> <tr><td>50.0</td><td>2.5</td></tr> </tbody> </table>	$I_B / \mu A$	I_C / mA	10.0	0.5	20.0	1.0	30.0	1.5	40.0	2.0	50.0	2.5		
	$I_B / \mu A$	I_C / mA													
	10.0	0.5													
	20.0	1.0													
	30.0	1.5													
	40.0	2.0													
50.0	2.5														
Draw a complete graph of I_C against I_B															
Tick \checkmark based on the following aspects :															
- A. Show I_B on Y-axis and I_C on X-axis			\checkmark												
- B. State the units of the variables correctly			\checkmark												
- C. Both axes are marked with uniform scale			\checkmark												
- D. All five points are plotted correctly			\checkmark												
- E. Best straight line is drawn			\checkmark												
- F. Show the minimum size of graph at least 5 x 4 (2 cm x 2 cm) square (counted from the origin until the furthest point)			\checkmark												
Score															
(d)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of ticks</th> <th>Score</th> </tr> </thead> <tbody> <tr><td>7</td><td>5</td></tr> <tr><td>5-6</td><td>4</td></tr> <tr><td>3-4</td><td>3</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>1</td><td>1</td></tr> </tbody> </table>	Number of ticks	Score	7	5	5-6	4	3-4	3	2	2	1	1		
	Number of ticks	Score													
	7	5													
	5-6	4													
	3-4	3													
	2	2													
1	1														
		5	5												
- I_C is directly proportional to I_B															

Graph of I_C against I_B 

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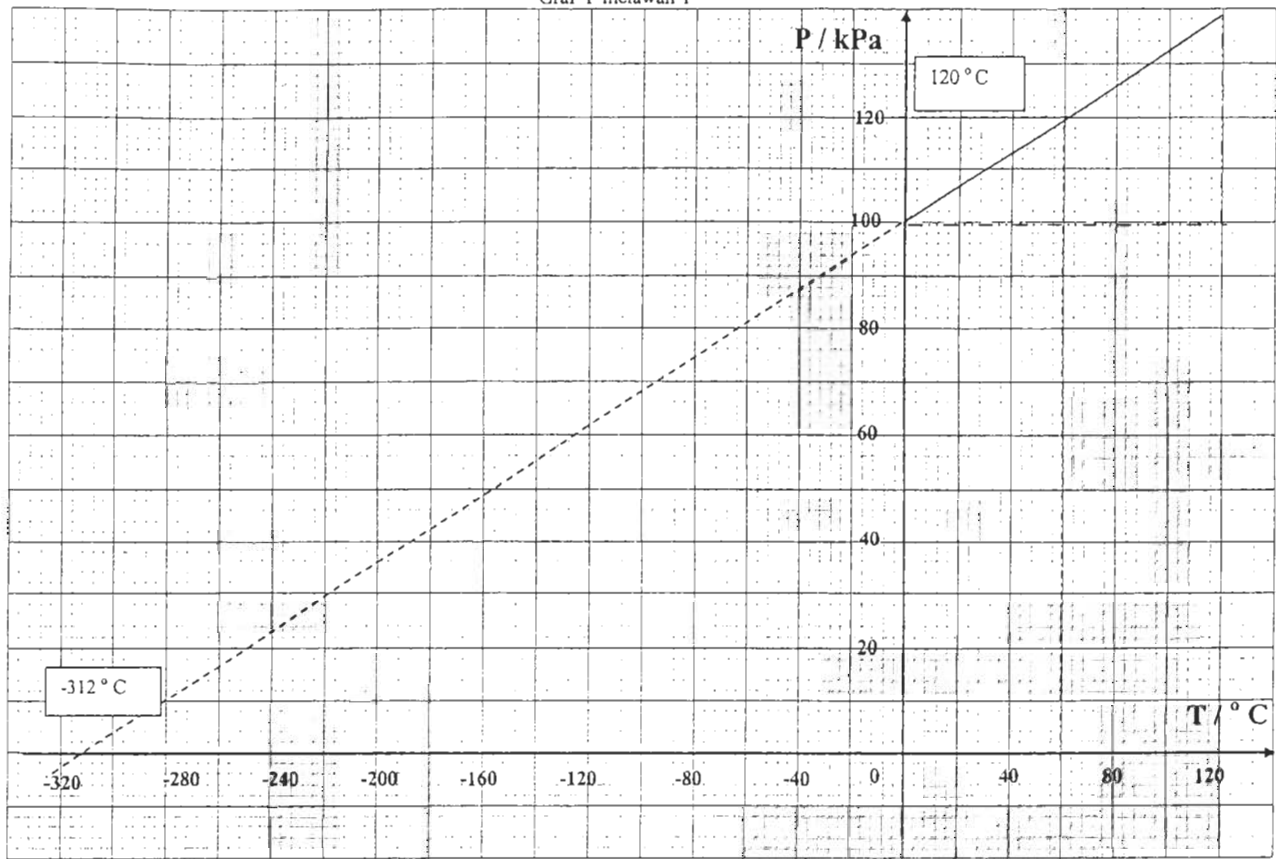
11

SULIT

11

(e)	-Ensure all connections in the circuit are tight -No short circuit (any relevant response)	1 1	1 1
NO	MARKING SCHEME	MARK	
		SUB	TOTAL
2 (a)	-Show the method to determine the value of P by showing the corresponding horizontal line with T = 60 °C -State the value of P correctly : 120.0 kPa ± 0.1	1 1	2
(b)	-Show the method to determine the value of the temperature by showing the extrapolated line -State the value within acceptable range: -312 °C ± 1	1 1	2
(c)	-P increases linearly with T	1	1
(d)	-Draw a sufficiently large triangle(6 cm x 3 cm) -Correct substitution $= \frac{138-100}{160-0}$ State the value / answer with correct unit =0.238 kPa °C ⁻¹	1 1 1	3
(e)	T = (227 + 273) -Correction substitution P = 0.238(227 + 273) -State the value of P with correct unit kPa	1 1 1	3
(f)	-the mixture of water is stirred continuously until the temperature of the water is steady	1	1

Graf P melawan T



4531

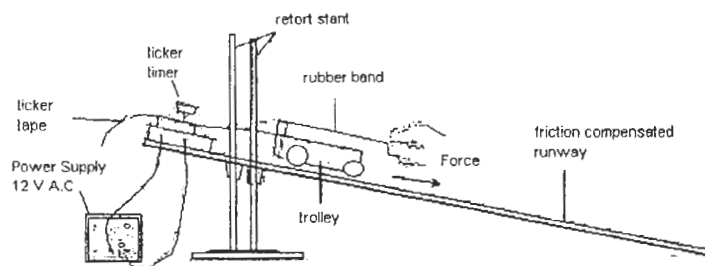
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SULIT

Section B

Question number 3

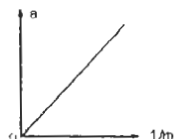
- (a) 1. If the mass increased so the acceleration decreased.
- (b) 1. The acceleration of an object decreases when its mass increases.
- (c) 1. To investigate the relationship between mass and acceleration.
2. Manipulated variable : Mass of trolley
Responding variable : Acceleration
3. Constant variable : Force
4. Ticker tape, cellophane tape, ticker timer, power supply, trolley, friction compensated runway and rubber band.
5. Diagram and label.



6. A trolley is pulled by rubber band which provides a constant unit of force.
7. Cut into 5-tick strips and a tape chart for the motion of the trolley is made. The acceleration of the trolley, a is calculated and recorded in table.
8. Repeated with two and then three identical trolleys stacked up.
9. The result is recorded in the table.

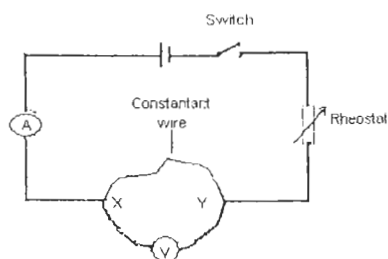
Mass, m /Number of trolleys	$1/m$	Acceleration, a/cms^{-2}
1		
2		
3		

10. A graph of a against $1/m$ is plotted.



Question 4.

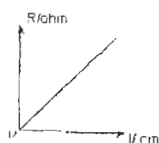
- (a) 1. The brightness of the bulb increased when the length of the wire decreased.
 (b) 1. The length of wire increase, the resistance of a conducting wire also increases
 (c) 1. To investigate the relationship between length of wire and resistance.
 2. Manipulated variable : Length of wire
 Responding variable : Resistance, R
 3. Constant Variable : Thickness of wire, type of wire, temperature of wire.
 4. Ammeter, Voltmeter, battery, rheostat, switch, 100 cm constantant (s.w.q 24), connecting wires.
 5. Figure.



6. Measure the initial length, $l = 20$ cm.
 7. Fix the ammeter, $I = 0.5$ A. The reading of the voltmeter, V is recorded in table. The value for resistance $R = \frac{V}{I}$, is calculated.
 8. Repeated for $l = 40$ cm, 60 cm, 80 cm and 100 cm. Calculated the resistance for each of the length of wire.
 9. Tabulation of the data.

l/cm	I/A	V/V	$R = V/I \Omega$
20.0			
40.0			
60.0			
80.0			
100.0			

10. Plot a graph of R against l .



V
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1. C	11. D	21. B	31. B	41. D
2. B	12. D	22. C	32. A	42. B
3. A	13. C	23. D	33. C	43. D
4. D	14. D	24. C	34. A	44. B
5. D	15. B	25. A	35. C	45. C
6. C	16. A	26. A	36. C	46. A
7. D	17. A	27. B	37. A	47. B
8. C	18. B	28. B	38. D	48. B
9. B	19. B	29. B	39. C	49. C
10. A	20. C	30. A	40. C	50. A